

IN THE CLAIMS:



This is a listing of claims as they currently stand:

1. (Previously Presented) A managing apparatus of a semiconductor manufacturing apparatus, comprising:
  - power measuring means for measuring electrical power consumption of electrical equipment used in the semiconductor manufacturing apparatus;
  - utility measuring means for measuring an amount of a utility fluid that is manufactured or processed;
  - means for obtaining an amount of electric power consumed when manufacturing or processing the utility fluid based on values measured by the utility measuring means;
  - energy consumption calculating means for adding together the electrical power consumption of the electrical equipment and the amount of electric power consumed when manufacturing or processing the utility fluid and obtaining energy consumption of the apparatuses used in semiconductor manufacturing on a per-unit basis;
  - factor measuring means for measuring factors needed to obtain the amount of heat discharged from the equipment used in the apparatus used in semiconductor manufacturing;
  - discharged heat amount calculating means for obtaining an amount of heat discharged on a per unit basis from the apparatus used in the semiconductor manufacturing based on values measured by the factor measuring means; and
  - display means for displaying the amount of heat discharged as obtained by the discharged heat amount calculating means and displaying the energy consumption as obtained by the energy consumption calculating means.
  
2. (Previously Presented) The managing apparatus of claim 1, wherein the utility fluid is a temperature control fluid that controls the temperature of the equipment.
  
3. (Previously Presented) The managing apparatus of claim 1, wherein the utility fluid is air that flows through an interior of the apparatus used in semiconductor manufacturing.

4. (Previously Presented) The managing apparatus of claim 1, wherein the utility fluid is a gas used in the apparatus used in semiconductor manufacturing.

5. (Previously Presented) The managing apparatus of claim 1, wherein the utility fluid is water used in the apparatus used in semiconductor manufacturing.

6. (Original) The managing apparatus of claim 1, wherein the apparatus used in semiconductor manufacturing includes equipment contained within a housing provided inside a clean room, and the discharged heat includes heat discharged from the equipment into the clean room via an interior of the housing.

7. (Original) The managing apparatus of claim 6, wherein the factor measuring means includes:

a first temperature measuring means for measuring a temperature inside the housing;  
a second temperature measuring means for measuring a temperature outside the housing; and

means for obtaining an amount of heat discharged from inside the housing to outside the housing based on the measured temperatures inside the housing and outside the housing.

8. (Original) The managing apparatus as claimed in claim 7, comprising means for providing a plurality of measuring points measured by the first temperature measuring means and the second temperature measuring means, operating the apparatus used in the semiconductor manufacturing under a variety of conditions and tracking the temperature at each measuring point, establishing an interrelationship between certain measuring points and other measuring points and producing a calibration curve, and estimating measurements at other measuring points based on measurements at certain measuring points and on the calibration curve.

9. (Original) The managing apparatus as claimed in claim 7, wherein:  
the factor measuring means includes wind speed measuring means for measuring a wind speed inside the housing and a wind speed outside the housing; and  
wind speed measurements are included in a equation for obtaining the amount of heat discharged from inside the housing to outside the housing.

10. (Original) The managing apparatus as claimed in claim 6, wherein the apparatus used in semiconductor manufacturing includes:

an exhaust path for exhausting the inside of the housing and removing the heat from inside the housing to outside the clean room; and

the amount of heat discharged includes heat removed through the exhaust path by a gas exhausted from the exhaust system.

11. (Original) The managing apparatus as claimed in claim 10, wherein the factor measuring means includes:

exhaust path temperature measuring means for measuring a temperature inside the exhaust path;

exhaust path wind speed measuring means for measuring wind speed inside the exhaust path; and

means for obtaining an amount of heat discharged by the gas exhausted through the exhaust path based on measurement results obtained by the exhaust path temperature measuring means and the exhaust path wind speed measuring means, a cross-sectional surface area of the exhaust path and the temperature inside the clean room.

12. (Original) The managing apparatus of claim 1, wherein the apparatus used in the semiconductor manufacturing includes equipment cooled by a cooling fluid that flows along a flow path and the amount of heat discharged includes an amount of heat removed by the cooling fluid.

13. (Original) The apparatus of claim 12, wherein the factor measuring means includes flow measuring means for measuring a flow of the cooling fluid and the apparatus obtains a heat amount removed by the cooling fluid based on flow measurements and a difference in temperature between the cooling fluid on the intake side of the equipment and the cooling fluid on the exhaust side.

14. (Previously Presented) The managing apparatus of claim 13, comprising:

a computer that includes the discharged heat amount calculating means, the energy consumption calculating means and the display means; and

a signal conversion unit for converting measurement results of the factor measuring means to signals that can be processed by the computer.

15. (Original) The managing apparatus as claimed in claim 14, wherein the computer and the signal conversion unit are provided on a cart.

16. (Original) The managing apparatus as claimed in claim 14, including the factor measuring means detachably attached to the measuring point and further connected via wiring to the signal conversion unit.

17. (Original) The managing apparatus as claimed in claim 14, including the factor measuring means that cannot be detached from the measuring point, the factor measuring means being connectable to as well as detachable from the signal conversion unit by wiring.

18. (Original) The managing apparatus as claimed in claim 1, comprising:  
operating cost measuring means for measuring measurement items related to an operating cost of the apparatus used in semiconductor manufacturing; and  
means for performing calculations using measurement results from the operating cost measuring means and a cost conversion factor calculated from numerical values corresponding to those measurement items and obtaining per-unit cost of the apparatus used in the semiconductor manufacturing apparatus as a sum total of the results of the calculations, the managing apparatus displaying the per-unit operating costs of the apparatus used in the semiconductor manufacturing at the display means.

19. (Previously Presented) The managing apparatus of claim 18, wherein:  
the operating cost measuring means utilizes the measuring means used when obtaining the amount of heat discharged and the energy consumption on a per-unit basis of the apparatuses used in semiconductor manufacturing; and  
the measurement results from the operating cost measuring means include the power consumption of the electrical equipment and an amount of power consumed when manufacturing or processing the utility fluid,

the cost conversion factor corresponding to the power consumption being the power consumption unit cost.

20. (Original) The managing apparatus of claim 18, wherein the semiconductor manufacturing apparatus comprises the equipment contained within the housing provided inside the clean room, the exhaust path for exhausting the inside of the housing and removing such exhaust outside of the clean room, and an exhaust fan provided on the exhaust path,

the operating cost measuring means being a means for measuring the exhaust gas air flow of the exhaust system, the cost conversion factor corresponding to the exhaust gas air flow being a cost per unit of air flow and a cost per unit of exhaust fan exhaust air flow of relevant systems equipment including an outside air processor when taking outside air into the clean room via the outside air processor.

21. (Original) The managing apparatus as claimed in claim 18, wherein the apparatus used in the semiconductor manufacturing has equipment cooled by the cooling fluid that flows along the flow path, and the operating cost includes a cooling cost obtained by performing calculations using the amount of heat discharged from the equipment to the cooling water and the unit cost of cooling the cooling water.

22. (Original) The managing apparatus of claim 18, wherein the apparatus used in the semiconductor manufacturing comprises equipment contained within the housing provided in the clean room and an exhaust system that exhausts the inside of the housing and cools the heat inside the housing, and

the operating cost includes a cooling cost obtained by performing calculations using the amount of heat discharged to the exhaust system and the unit cost of cooling with the exhaust system.

23. (Original) The managing apparatus of claim 18, wherein the apparatus used in the semiconductor manufacturing comprises equipment contained in the housing provided inside the clean room, and the operating cost includes a cooling cost obtained by performing calculations using the amount of heat discharged from the equipment to the clean room via the inside of the housing and the unit cost of cooling with a cooling system that cools circulatory air inside the clean room.

24. (Original) The managing apparatus of any of claims 1 through 23, comprising:

carbon dioxide emission measuring means for measuring measurement items relating to carbon dioxide emissions converted for the apparatuses used in semiconductor manufacturing; and

means for performing calculations using measurement results from the carbon dioxide emission measuring means and carbon dioxide emission conversion factors corresponding to those measurement items and obtaining a per-unit carbon dioxide emission level for the apparatus used in the semiconductor manufacturing apparatus as a sum total of the results of the calculations,

displaying the per-unit carbon dioxide emission level for the apparatus used in the semiconductor manufacturing so obtained at the display means.

25. (Previously Presented) The managing apparatus of claim 24, wherein the measurement result includes power consumption of the electrical equipment measured when obtaining power consumption on a per-unit basis for the apparatus used in the semiconductor manufacturing and an amount of power consumed when manufacturing or processing the utility fluid, and

the carbon dioxide emission conversion factor used for calculating with these power consumptions is a crude oil equivalent coefficient that indicates an amount of carbon dioxide generated when producing a unit of electrical power.

26. (Previously Presented) The managing apparatus of claim 24, wherein the apparatus used in semiconductor manufacturing includes:

equipment contained in the housing provided in the clean room; and

means for obtaining power consumption consumed by the clean room cooling system that corresponds to an amount of heat discharged into the clean room from the equipment via the inside of the housing and including a generated amount of carbon dioxide converted by multiplying the power consumption by the crude oil equivalent coefficient in an amount of carbon dioxide generated on a per-unit basis for the apparatus used in the semiconductor manufacturing.

27. (Original) The managing apparatus of claim 26, including:  
temperature measuring means for measuring the temperature inside the housing,  
temperature measuring means for measuring means for measuring the temperature outside the  
housing, and means for obtaining the amount of heat discharged from inside the housing to  
outside the housing based on the temperatures inside the housing and outside the housing,  
and

further having means for setting a plurality of measuring points to be measured by the  
temperature measuring means, operating the apparatus used in the semiconductor  
manufacturing under a variety of conditions and tracking the temperature state at each  
measuring point, establishing an interrelationship between certain measuring points and other  
measuring points and producing a calibration curve, estimating measurements at other  
measuring points based on measurements at certain measuring points and on the calibration  
curve, and obtaining an energy consumption consumed by the cooling system that  
corresponds to the amount of heat discharged into the clean room using the estimated  
temperature values.

28. (Original) The managing apparatus of claim 24, comprising:  
fuel gas consumption measuring means for measuring an amount of fuel gas  
consumed in the combustion of exhaust gas exhausted from the apparatus used in the  
semiconductor manufacturing;  
carbon dioxide emission measuring means for multiplying the measurements by an  
amount of carbon dioxide generated for combusting fuel gas on a per-unit basis and obtaining  
an amount of carbon dioxide generated; and  
means for including the carbon dioxide emissions obtained by the carbon dioxide  
emission measuring means in the amount of carbon dioxide generated on a per-unit basis for  
the apparatus used in semiconductor manufacturing.

29. (Previously Presented) A method of managing a semiconductor  
manufacturing apparatus, including:

measuring power consumption of electrical equipment used in the semiconductor  
manufacturing apparatus;

measuring an amount of a fluid that is manufactured or processed and obtaining an  
amount of power consumed when manufacturing or processing the utility fluid based on the  
measured value;

adding the electrical equipment power consumption and the amount of power consumed when manufacturing or processing the utility fluid based on the measured value and obtaining energy consumption on a per-unit basis for the apparatus used in the semiconductor manufacturing;

measuring factors needed to obtain an amount of heat discharged from the equipment used in the semiconductor manufacturing apparatus and obtaining an amount of heat discharged on a per-unit basis for the semiconductor manufacturing apparatus based on the measurements; and

displaying the energy consumption and the amount of heat discharged on a per-unit basis for the semiconductor manufacturing apparatus.

30. (Previously Presented) The method of managing a semiconductor manufacturing apparatus of claim 29, wherein:

the semiconductor manufacturing apparatus includes equipment contained within a housing provided inside a clean room, an exhaust path for exhausting an interior of the housing and removing heat from the interior of the housing to outside the clean room, and equipment that is cooled by a cooling fluid that flows along a flow path; and

the amount of heat discharged includes an amount of heat discharged from the equipment contained inside the housing to the clean room via the inside of the housing, an amount of heat removed by a gas exhausted from the exhaust path, and an amount of heat removed by the cooling fluid.

31. (Previously Presented) The method of claim 29, including:

measuring a measurement item related to an operating cost of the apparatus used in semiconductor manufacturing, performing calculations using those measurement results and a cost conversion factor calculated from numerical values corresponding to the measurement items, obtaining a per-unit cost of the apparatus used in the semiconductor manufacturing as a sum total of the results of the calculations, and displaying the cost on a display means.

32. (Previously Presented) The managing method of any one of claims 29 through 31, including:

measuring measurement items related to a converted carbon dioxide emission level for the apparatus used in the semiconductor manufacturing;

performing calculations using the measurement results obtained in the preceding step and a carbon dioxide emission level conversion factor corresponding to those measurement items, and obtaining a per-unit carbon dioxide emission level of the apparatus used in the semiconductor manufacturing as a sum total of the results of the calculations; and displaying the results obtained in the preceding step on the display means.